MINES ADMINISTRATION PTY LIMITED

FINAL REPORT, 1982

E.L. 2487

GRANT W. CARDNO
JULY, 1982

ACKNOWLEDGMENT

The author wishes to acknowledge the assistance received from Geologists, Barry Peach and Chris Edgoose of the Northern Territory Geological Survey, Jim Treloar of the D.M.E. for assisting with water sampling equipment and Dr. Charles Butt of the C.S.I.R.O., Perth for his technical assistance.

ABSTRACT

Arnhem Land Mining Limited and Australia and New Zealand Exploration company (ANZECO) are both registered subsidiaries of the Union Carbide Corporation.

Exploration Licence 2487 was granted to Arnhem Land Mining Limited on September 11th, 1980.

The area was taken up to search for uranium deposits in Lower Proterozoic sediments onlapping the (?) Archean Litchfield Complex, in a situation analagous to Rum Jungle.

Due to the lack of encouraging results, the ground was relinquished on the 9th June, 1982.

This report documents the investigations on E.L. 2487 for the tenure period.

Expenditure for the project since the date of inception until completion was $44,064.64. Expenditure statements are included in the Appendices. (Appendix I).

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1. INTRODUCTION

Investigations of the area of E.L. 2487 have included the following work:-

a) Preliminary information search by ANZECO.

b) Field exploration by ANZECO staff and drilling contractors during the 1981 dry season.

c) Examination and analysis of results (ANZECO).

d) Final Appraisal of tenement by AAR Geologist previously working E.L. 2487 for ANZECO.

1.1 Location

E.L. 2487 is located approximately 100km south-south west of Darwin (see Fig.1) it lies within the Pine Creek 1:250,000 Geological sheet, 1:63,360 and 1:100,000 Reynolds River sheet areas.

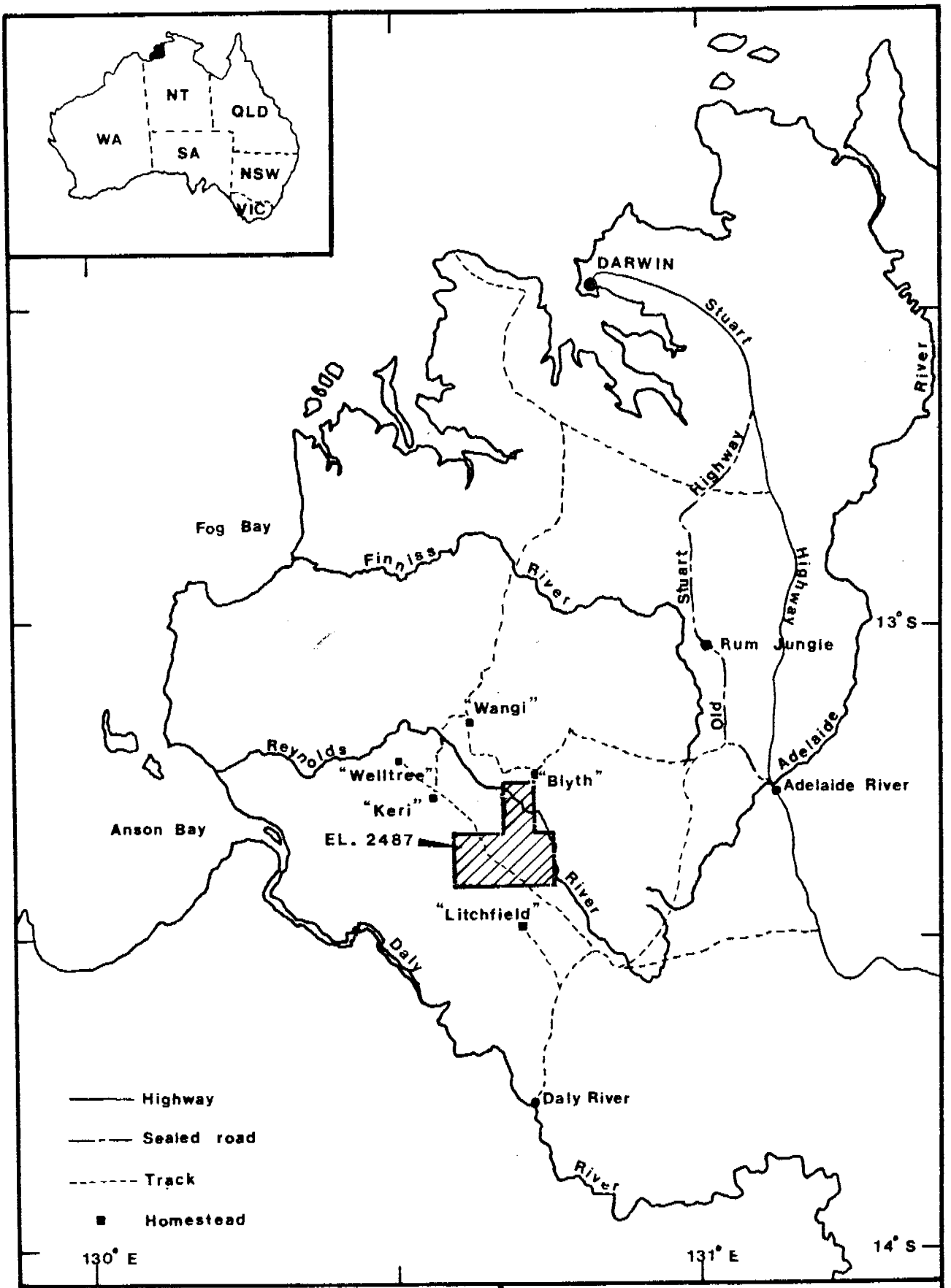
A detailed description of E.L. 2487 is given below:-

ALL THAT piece or parcel of land in the Northern Territory of Australia containing an area of 83.56 square miles (216.39 sq.km) more or less, the boundary of which is described as follows:-

> Commencing at the intersection of latitude 13 degrees 15 minutes with longitude 130 degrees 40 minutes thence proceeding to the intersection of latitude 13 degrees 15 minutes with longitude 130 degrees 43 minutes thence proceeding to the intersection of latitude 13 degrees 20 minutes with longitude 130 degrees 43 minutes thence proceeding to the intersection of latitude 13 degrees 20 minutes with longitude 130 degrees 45 minutes thence proceeding to the intersection of latitude 13 degrees 25 minutes with longitude 130 degrees 45 minutes thence proceeding to the intersection of latitude 13 degrees 25 minutes with longitude 130 degrees 35 minutes thence proceeding to the intersection of latitude 13 degrees 20 minutes with longitude 130 degrees 35 minutes thence proceeding to the intersection of latitude 13 degrees 20 minutes with longitude 130 degrees 40 minutes thence proceeding to the intersection of latitude 13 degrees 15 minutes with longitude 130 degrees 40 minutes, subject to all applications for mining tenements and excluding therefrom all mining tenements granted or registered and all reserves included within the definition of "reserve" in section 7 of the Mining Act.

1.2 Access

Access to E.L. 2487 is gained via the Darwin to Daly River Mission track passing through the E.L. This track connects with the Adelaide River - Daly River Mission road, such that



Scale 1 : 1,000,000

0 10 20 30 40 50 Km.

AUTHOR : C.M. SENNITT

DATE : JULY , 1982

FIGURE 1

E.L.2487 Litchfield

LOCATION MAP

the area may be approached either from the south or from the north via Wangi and Keri Stations. Within the E.L., Access is restricted to the above tracks, the Litchfield outstation track and a few station tracks and fence lines.

Access becomes difficult during the "wet" season, particularly from the north, where the flood plain of the Reynolds River often becomes impassible from December to May.

Maps and Air Photographs

Maps - The table below shows the published maps available covering this area.

Type	Scale	Name	Date
Topographic	1:100,000	Reynolds River	1975
"	1:50,000	"	1960
"	1:250,000	Pine Creek	1978
Geological	1:63,360	Reynolds River	1955
Geological	1:500,000	Solid geology of the Pine Creek Geosyncline.	1979
Geological	1:250,000	Pine Creek Sheet SD52-8.	1962

Air Photographs - The table below shows the air photographs covering the E.L. and the surrounds.

Run -	Roll No. -	Photo -
1	4029	5805 - 5815
2	4030	5090 - 5080
3	4024	5375 - 5365
4	4025	5395 - 5405
5	4097	5365 - 5375
6	4041	5790 - 5780
7	4042	5090 - 5080
8	4026	5795 - 5785
9	4026	5965 - 5955
10	4027	5010 - 5020

Authority	CAG
Area	Daly River
Date	1.8.1963
Type	Black/White
Altitude	8320 ft.
Focal Length	151.95mm

1.3 Topography and Climate

E.L. 2487 is a gently sloping low lying parcel of land with a relative relief of approximately 85m giving a northerly fall towards the Reynolds river which crosses the north and north eastern portions of the E.L.

The uniform topography and geology has given rise to the development of a complex network of dendritic incised streams

draining radialy from the high ground in the centre of the E.L.

The area of E.L. 2487 experiences a tropical climate with a distinct wet season from November to April. During this time the area has a high thunderstorm frequency and recieves most of its rainfall which averages more than 1200mm annually.

Due to the coastal location and presence of large rivers the humidity is generally high and the average daily maximum temperature has a low range - 30°C in July to 33°C in January. The daily minimum range is 18° and 24°C for the same periods.

1.4 Tenement Situation

Exploration Licence 2487 was granted to Arnhem Land Mining Limited on 11th September, 1980 for a period of twelve months with an expenditure covenant of $20,000. A twelve month renewal was granted from the 11th September, 1981.

For the tenure period prior to 1st February, 1982, Australia and New Zealand Exploration Company (ANZECO) carried out exploration on E.L. 2487 on behalf of a joint venture between ANZECO and AAR Limited; a subsidiary of CSR Limited.

From 1st February, 1982 until relinquishment on the 9th June, 1982, AAR Limited were managers of the tenement.

2. REGIONAL GEOLOGY (See Figure 2)

E.L. 2487 is within the Litchfield Province which is the western most structural block of the Pine Creek Geosyncline - the exposed basement for the northwest part of the Northern Territory.

The regional geology of the Pine Creek Geosyncline has been described in detail by Needham et.al. 1980 and will be described briefly in this report.

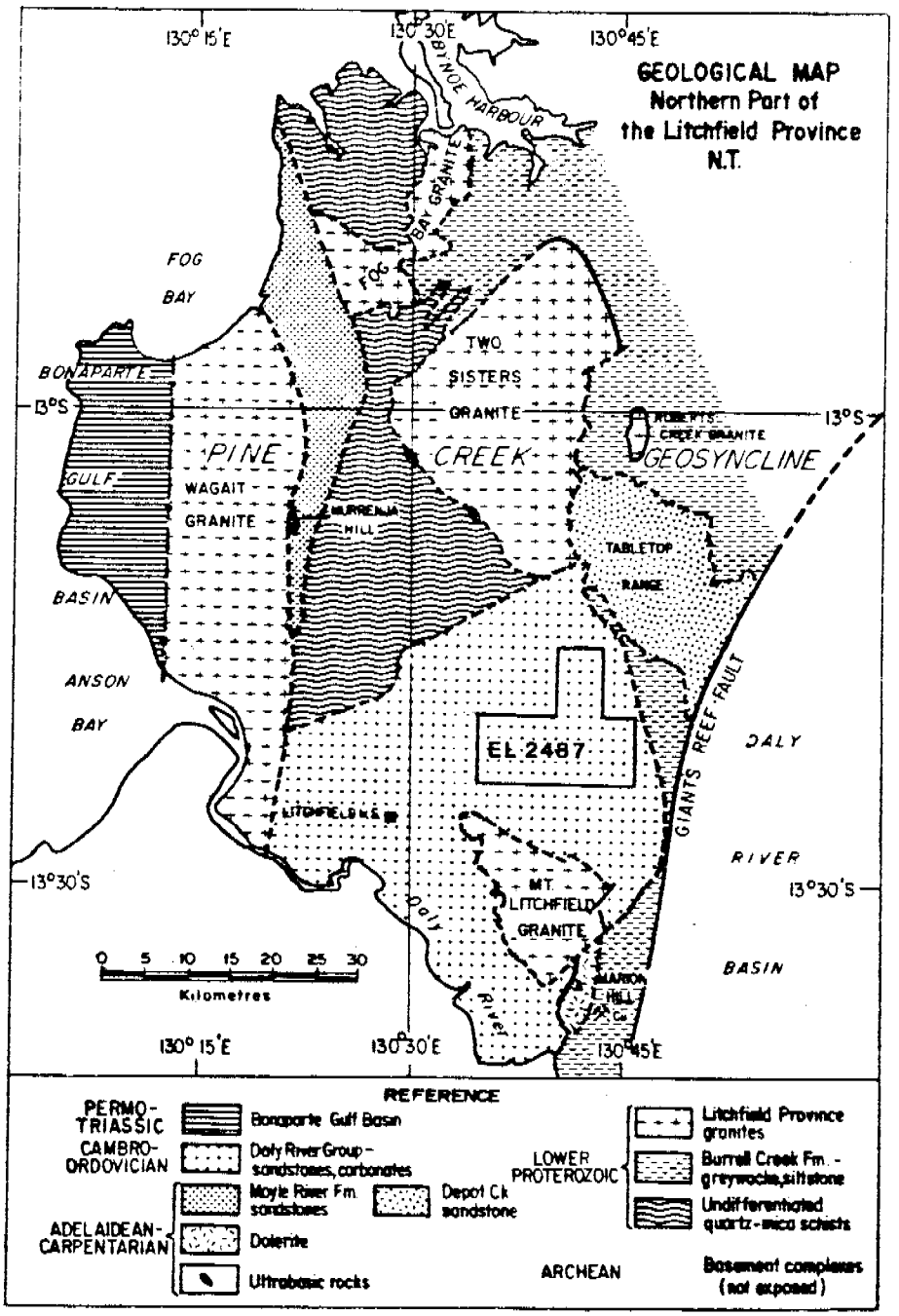
Table 1 summarises the regional geology.

By correlating a tuffaceous sequence Needham et.al. (op cit) have now defined the Pine Creek Geosyncline as a single intracratonic basin containing a thick sequence of mainly pelitic and psammitic Lower Proterozoic sedimentary rocks with interlayered tuff units resting on an Archean granitic basement. Proterozoic rocks continue beyond the area of outcrop under Carpentarian and younger cover on all sides, which conceal the basin margins.

2.1 Litchfield Province

The Litchfield Province extends from the Giant's Reef Fault, which is a north east trending dextral wrench fault having a horizontal displacement of 6km, west to the edge of the Bonaparte Gulf Basin.

FIGURE 2



Geological Map (after Berkman , 1980)

TABLE 1 - STRATIGRAPHIC UNITS (AFTER NEEDHAM ET. AL. 1980)

AGE	GROUP	FORMATION	LITHOLOGY
Cretaceous		Bathurst Island F.	Fine to medium grained marine sandstones.
Cambrian	Daly River Gp.	Jinduckin F. Tindall Limestone. Antrim Plateau Volc.	Ferruginous sandstone, siltstone, minor dolomite. Crystalline limestone. Massive vesicular basalt, minor agglomerate.
Lower Proterozoic (Carpentarian)	Tolmer Gp.	Depot Creek Sandstone.	Massive cross-bedded quartz sandstone, pebble bands.
	Katherine River Gp.	Kombolgie Form.	Medium to coarse quartz sandstone, minor andesite basalt and rhyolite.
Lower Proterozoic	Finniss River Gp.	Burrell Creek Form.	Siltstone, shale and greywacke.
	South Alligator Gp.	Kapalga Form.	Ferruginous siltstone, chert bands.
		Gerowie Tuff.	Black-green cherty tuff, green argillite, green tuffaceous greywacke.
		Koolpin Form.	Ferruginous siltstone with chert bands, pyritic carbonaceous shale, silicified dolomite minor jasper.
	Mount Partridge Gp.	Nourlangie Schist	Quartz mica schist,mica quartz schist,minor quartzite.
		Wildman Siltstone.	Siltstone, in places carbonaceous at depth, red and cream laminated siltstone, minor quartzite and quartz greywacke.

TABLE 1. (Contd)

AGE	GROUP	FORMATION	LITHOLOGY
	Mount Partridge Gp. (Contd)	Acacia Gap Sandstone Member.	Quartz sandstone and feldspathic sandstone with pyritic carbonaceous siltstone and quartz siltstone interbeds.
		Mount Hooper Sandstone.	Medium quartz sandstone and quartzite with some chert fragments, siltstone, phyllite, feldspathic quartzite, pebbly in places, chert pebble conglomerate cross-bedded.
		Mundogie Sandstone	Coarse medium quartz sandstone and orthoquartzite, commonly pebbly, quartz pebble conglomerate, siltstone cross-bedded scoured and graded beds. Minor schist amphibolitic in places.
	Namoona Group	Stage Creek Volcanics	Mafic volcanic breccia, hawaiite, tuff, tuffaceous shale, tuffaceous greywacke.
		Cahill Formation	Mica feldspar quartz schist, quartz mica schist, with garnet, amphibole and kyanite in places, carbonaceous schist, crystalline dolomite-magnesite, and calc-silicate gneiss near base.
		Masson Formation	Ferruginous shale (mostly pyritic and carbonaceous at depth) fine-coarse calcareous and volcanic greywacke, calcarenite, sandstone, limestone.
	Batchelor Gp.	Coomalie Dolomite.	Dolomite, magnesite, dolomite breccia tremolite schist, calcilutite, algal structures and evaporite pseudomorphs in places.
		Crater Formation.	Feldspathic sandstone, pebble conglomerate, siltstone, pyritic in part, basal ferruginous conglomerate in places.
		Celia Dolomite	Dolomite, magnesite, silicified or with algal structures in places, tremolite schist, minor sandstone, arkose, carbonaceous sediments.

TABLE 1. (Contd)

AGE	GROUP	FORMATION	LITHOLOGY
	Batchelor Group. (Contd)	Beestons Formation.	Arkose, feldspathic sandstone, conglomerate, siltstone.
	Kakadu Group.	Munmarlary Quartzite.	Gneissic massive to friable orthoquartzite, minor schist.
		Mount Howship Gneiss	Very coarse white feldspathic leucogneiss, minor schist, rare garnet and amphibole.
		Kudjumarndi Quartzite.	Orthoquartzite, quartz gneiss, minor schist, rare cross-bedding, rare amphibole.
		Mount Basedow Gneiss	White-grey-pink coarse muscovite biotite gneiss, granitoid gneiss, minor schist.
Archaean		Rum Jungle Complex Waterhouse Complex Nanambu Complex.	Gneiss, migmatite, leucocratic granite, biotite - chlorite schist, amphibolite and quartzite.
Upper Proterozoic (Carpentarian)	Granite.	Margret Granite. Cullen Granite Fenton Granite. Burnside Granite Mt. Bundy Granite Jim Jim Granite Mt. Shoobridge Granite.	Porphyritic adamellite, fine grained granite, hornblende - biotite granite and aplite dykes.
Lower Proterozoic		Zamu Dolerite.	Differentiated continental tholeiitic basalt sills, olivine dolerite, metamorphosed to amphibolite in places.

2.2 Proterozoic Granitoids and metasediments

There are five granitoid bodies within the Province. Garnetiferous and gneissic in part with adamellite to granodiorite compositions. A single Rb/Sr dating gives an age of 1800m.y.

Metamorphic evidence supports the proposal that the granitoids north of Daly River were emplaced during the 1800m.y. metamorphic event.

The granitoid margins are migmatised and transitional into extensive areas of metasediments, varying from green schist to upper amphibolite/granulite grade faces.

These undifferentiated quartz-mica schists have been assigned to the Lower Proterozoic. Their regional strike is northerly to north westerly.

Burrell Creek Formation

Forming the north, east and southern boundaries of the province are the greywackes and siltstones of the younger Burrell Creek Formation. The quartz- mica schists are thought to merge into the Burrell Creek Formation outside the Province.

2.3 Mafic Igneous Rocks

During late Carpentarian to Adelaidean times, gabbroic masses have intruded along major geological boundaries centred on the Welltree area.

Further south at a similar time, the Marion Hill dolerite has intruded on the southeast flank of the Mt.Litchfield Granite.

2.4 Moyle River Formation

In late Proterozoic times the well rounded quartz sandstones of the Moyle River Formation were deposited.

This formation is only metamorphised along regional faults where it is quartz veined and altered to sericite quartzite. This is a lithological equivalent of the Depot Creek Sandstone.

2.5 Daly River Group

During palaeozoic and post palaeozoic times, wide spread transgression led to deposition of the relatively undisturbed sandstones, silts and carbonates of the Daly River Basin. Associated with this was widespread volcanism which is the probable origin for some mineralisation in the area. (see Table 1 Antrim Plateau Volcanics).

2.6 Permian (Bonaparte Gulf Basin)

The Permian is represented by up to 1980m of sandstones and

shales with thin coal seams in the Bonaparte Gulf Basin. This is known from exploration drill holes and offshore wild cat wells (Mendum, 1972).

The sequence onshore has a lateritic capping and no outcrops are known north of the Daly River.

2.7 Cretaceous

Cretaceous sedimentation has been reported by Kewanee Australia Pty. Limited (CR 74/13).

Near Raft Point, Bynoe Bay, a deeply weathered sequence of gneiss and schist is overlain by relatively flat lying ferruginous quartz sandstone up to 10m thick, which Kewanee interpret as being Cretaceous.

2.8 Cainozoic

During drilling programs on the flood plains between the Reynolds River and Finniss River, BHP encountered extensive Cainozoic muds in excess of 30m thick in places. These were often pyritic.

Sandy and mud flats cover extensive drainage areas of the Litchfield Province.

3. GEOLOGY OF E.L. 2487

The geology of E.L. 2487 is heavily masked in the north and northeast by unconsolidated alluvial sand washed into the area of the Reynolds River. Elsewhere on the E.L. the cover is soil, often lateritic, to a depth of 8m in places.

There are very few outcrops within the Tenement. On the high point at grid reference 5071-800195, is a small outcrop of weathered sandy siltstone. To the east of the tenement, outcrops of weathered sandstone were observed in the bed of the Reynolds River.

It is possible that the outcrops observed are large floaters as found on black soil plains in the Litchfield Station area, and are likely to have been derived from the Moyle River Formation sandstones. This correlates the floaters with the Cambrian Daly River Group.

Most of the information on the geology has been derived from drilling, which shows the near surface rock types to be relatively flat lying, blue grey, finely micaceous, fissile sandy siltstones with carbonate horizons, belonging to the Daly River Group.

These sediments have not been conclusively drilled to basement, however, the indications are that they are approximately 100m thick within the E.L. (See BHP Drilling, Page 7).

Drilling by BHP who explored E.L. 897 (now partly E.L. 2487) from 1973-1976, intersected arkose below the Daly River Group at a depth of 75.3m and 99.6m along the southern boundary of the E.L. From

this, BHP predict a subsurface granite high extending north through the E.L. If correct, this indicates the lithologies beneath E.L. 2487 to be devoid of Lower Proterozoic sediments.

The Litchfield Granite outcrops close to the southwest corner of the E.L. which is a natural area of geological interest.

4. PREVIOUS WORK

4. Discussion

The Litchfield Exploration Licence has been covered by a number of regional mapping programmes by the Bureau of Mineral Resources and in 1981 by the Northern Territory Geological Survey (N.T.G.S.).

The area was mapped as part of the Reynolds river 1:63,360 map (1962) the Pine Creek 1:250,000 geological map (Malone 1962) and by Walpole et.al. (1968).

More recently, the area was covered during the mapping of the Pine Creek geosyncline 1:500,000 sheet (Needham et.al (1980).

During 1981 the N.T.G.S. worked in the Reynolds River area as a part of their sheet by sheet coverage of the Pine Creek Geosyncline. Their program included airborne radiometrics and magnetics, shallow stratigraphic drilling and extensive outcrop examination. The airborne surveys gave complete coverage of E.L. 2487.

Four sets of open file reports are directly related to the E.L. Exploration was mainly for uranium and later for phosphates in the Daly River Basin. (see reference).

4.2 Summaries of Findings

BHP Reports

The ground follow-up of the radiometric anomalies detected during the aerial survey showed that all were due to localised enrichment on laterite or Tindall Limestone. The highest soil sample value was 3 ppm U over the highest anomaly at G.R. 820270.

Geological mapping indicated that the areas is devoid of outcrop except for minor scattered outcrop around G.R. 850240 (Reynolds River 1:100,000 sheet) and minor outcrop of ferruginous sandstone in the bed of the Reynolds River at G.R. 855295 and 835235. Granite and ferruginous siltstone outcrop was encountered at G.R. 810100, approximately 6km south of the area.

BHP drilled 5 diamond and 1 percussion holes on the area, another two diamond and two percussion holes immediately outside the area, eight diamond and twelve auger holes in the northern extremity of the Basin, approximately 20km further north.

Summary of BHP Drill Holes

	No	G.R. (5071-)	Depth	Stratigraphy
Diamond	?	770230	90m.	Daly River Group
	?	800201	77m.	" " "
	?	800199	21m.	" " "
	5	872198	72.05m.	" " "
	6	893073	99.6m.	" " "
	2	715170	75.3m.	0-73.65 Daly River Group 73.65-75.30 arkose (Litchfield Granite?)
	4	800144	72.05m.	Daly River Group
Percussion	3	746273		No details available
	4	708312		" " "
	?	831299	30.97m.	Quaternary, derived from? Chilling Sandstone.(Daly River Group Member).

Kewanee Australia Pty.Ltd. Reports

Kewanee Australia Pty Ltd held a rectangular block measuring 6 miles N/S by 12 miles E/W and centred on G.R. 910020, (Daly River 1:100,000 Sheet), south of E.L. 2487.

This company carried out gridding, stream sediment sampling, geochemical surveys, ground and airborne radiometrics/magnetics and geological mapping. Three diamond holes were drilled.

Hole No	G.R. (5071-)	Depth	Stratigraphy
11	89005	81.49m.	0 -41.63 limestone, siltstone, sandstone 41.63-46.93 conglomerate 46.93-61.50 chlorite schist 61.50-65.07 pegmatite granite 65.07-89.9 chlorite schist Palaeozoic/Lower Proterozoic unconformity at 46.93m.
12	360m.W of 11	89.30m (Inclined) = 83.92m (Vertical)	0 -82.38 limestone/siltstone 82.38-85.04 conglomerate 85.04-89.30 schist Palaeozoic/Lower Proterozoic unconformity at 85.04 inclined = 79.91 vertical depth
13	890030	198.12 vert.	Piles of shales, volcanics - details not given in log. Probably Daly River Group.

Continental Oil Company Reports

Continental Oil Company (Plants and Food Division) held the area between 1967 and 1969 and were exploring for phosphates in the Daly River Group.

Three percussion holes were drilled in 1967. A summary is given below:-

Hole No	G.R. (5071-)	Depth	Stratigraphy
?	841168	45.3m.	Daly River Group sandstone
?	840145	21.63m	0-12.19 Daly River Group 12.49-21.63 Chilling Sandstone
?	840106	23.16m	Daly River Group

The Tipperary Land Corporation Reports

The Tipperary Land Corporation has carried out extensive exploration in the Daly River and adjacent cambrian basins in search of phosphates. Poor results and other studies indicate that the basin was too shallow for significant phosphate deposition.

Tipperary Land Corporation drilled three holes for phosphates and bauxite approximately 40km to the southwest in 1968.

Hole No	Position	Depth	Stratigraphy
Douglas	13° 43' S 131° 24' E	88.39m.vert.	0-86.8 limestone 86.8-88.39 granite
Tipperary	13° 46' S 130° 59' E	121.9m.vert.	0-120.39 limestone 120.39-121.9 basalt probably Antrim Plateau Volc.
Douglas 2	13° 42'40"S 131° 14'30"E	95.09m.vert.	0-95.09 limestone, calcareous shale and siltstone-resumably Daly River Group.

5. CURRENT EXPLORATION

At present exploration is concentrated to the north in the Finnis River area and the Daly River to the south in the search for base metals.

Magnetic and I.P. anomalies in Proterozoic, quartz-mica-schists

have been the main target.

The companies involved have been holding this ground for several years which has limited the information on open file.

6. DATA STUDIES

6.1 Magnetics

Examination of the airborne magnetic data flown on a 500m spacing by the N.T.G.S. shows a complex of magnetic anomalies to the north of E.L. 2487 in the Wangi and Welltree Station areas. These are caused by quartz-biolite- garnet schists of the Lower Proterozoic that contain variably, up to approximately 3%, pyrrhotite, magnetite and other minor sulphides.

This mineralisation is thought to be syngenetic with re-mobilisation assisted by late Carpentarian gabroic and pegmatitic intrusions seen outcropping in the area.

Over E.L. 2487 the magnetic contrasts are very low. The single feature which has previously been observed in a BMR Survey is a weak magnetic linearment which cuts the E.L. in a northeast to southwest direction. This is likely to be a fault expression.

Similar features in the region are known to originate from mafic dykes which have emanated from major joint and fault features.

There is no magnetic contrast observed along the contact of the Litchfield Granite and the surrounding sediments in the S.W. corner of the E.L.

The lack of magnetic response in this area has thrown doubt on the link-up of the anomalous Wangi and Welltree complexes with the mineralised magnetically active belt at Daly River.

6.2 Radiometrics

Radiometric surveys flown by the BMR and N.T.G.S. show the area of E.L. 2487 to have only minor radiometric response. This is to be expected with the existence of a considerable cover of Cambrian and younger sediments.

BHP carried out swamp auger drilling on E.L. 71 to the north to test for possible accumulations of uranium in Cainozoic sediments.(See report CR 76/69A). The highest uranium content found was 9ppm. Several anomalies of above background uranium values have been found in some Cambrian sediments,

Surface radiometric anomalies were shown to be due to either heavy lateritic scree or blocky lateritic outcrop.

From studies of some Litchfield Province granites, Kewanee Australia Pty Ltd, exploring in the Bynoe Bay area to the north, found that radiometric zones are indicative of later thorium rich granitic or pegmatitic intrusives within the Litchfield complex. Assay results support the evidence that the uranium is bound up within the lattice structure of thorium rich minerals such as monazite. The assay gave 30ppm uranium and 3770ppm thorium.

Generally the granites of the area give high thorium or potassium counts with low values in the uranium channel.

7. 1981 EXPLORATION, E.L.2487 (ANZECO)

Due to the depth of Cambrian and more recent cover, it was realised that exploration techniques would have to be those used in the search of blind mineralisation.

The two main techniques used were those of helium and radon emanometry as described below.

Description of Techniques

7.1 Helium Detection

Helium in the near surface atmosphere exists at a near constant level of approximately 5200 ppb. The main natural source for helium near the earths surface is derived by alpha particles from radioactive decay combining with free electrons to become a helium atom.

Samples of gases are collected from soils or, for greater sensitivity, from water samples extracted from set depths within the water table.

The sampling equipment is a soil probe or a self sealing water bore sampler. In the Litchfield program a BMR owned Kahlisco, through flow water sampler was used. The water sample was degassed and the gas sample analysed in the ANZECO owned 120 SSA Helium leak detector. This instrument is now in America. The CSIRO in Perth have a laboratory made helium mass spectrograph which is the only one known in Australia at present.

The values obtained are then compared with a run of atmospheric readings then analysed statistically.

7.2 Radon Detection

"Radon cups" were lowered down the drill holes on a line to a standard height above the water table. The drill hole is then capped to allow the hole conditions to stabilise and avoid atmospheric dilution.

After a period approximately 10 days exposure, the cups were removed from the hole and read to give a gamma count from the radioactive decay of Rn^{222}. The values obtained are

arbitrary and are analysed statistically to determine lithologic and local background levels.

7.3 Drilling

An attempt was made to drill holes to the water table using the company owned Gemco 210 auger rig, however, firm rock was encountered before the water table could be reached.

In September, 1982, Stanley Drilling Contractors of Perth were contracted to drill a series of percussion holes using a Mole-Pioneer rig. A program of 13 holes was completed within the E.L. ranging in depth from 12m to 52m. The aggregate meterage drilled was 344m. See drill hole location plan (map 1).

8. RESULTS (See Table II)

8.1 Drilling Results

All the drill holes were collared in and terminated in Lower Palaeozoic lithologies of the Daly River Group.

When fresh, these are blue grey, finely micaceous, fissile sandy siltstones with carbonate horizons.

From the percussion samples, there were no indications of mineralisation. All the cuttings were scanned with a hand spectrometer. No anomalous readings were observed.

Loss of sample and highly variable drilling rates indicated the ground to be cavernous within some limestone lenses.

8.2 Radon Results

The radon method used has been found to be very sensitive, especially when long exposure/integrating times are used. The limiting factor is that Radon 222 has a half life of 3.85 days which limits the distance the gas is able to effectively travel before decaying.

Contributing to the readings obtained is an amount of thoron derived gamma counts, since the radon cups did not have a thoron filter. This does not affect the survey as a comparitive tool.

The set of results obtained is high compared with results from soil surface use of the same technique with similar thickness of cover. This is to be expected due to the high atmospheric dilution from shallow hole soil exposures and the greater distance of travel required of the gas.

The high counts of 11339 and 8814 gamma counts per 2 minutes are definitely anomalous.

The Borehole Radon Contour Map (figure 6) shows the trend of an almost exponential decrease in values to the north from the

TABLE II - E.L. 2487 LITCHFIELD WATER ANALYSIS RESULTS

HOLE NO	HEIGHT ABOVE SEA LEVEL (METRES)	STANDING WATER LEVEL DEPTH BELOW DRILL COLLAR (METRES)	STANDING WATER LEVEL ABOVE SEA LEVEL (METRES)	WATER SAMPLING DEPTH (METRES)	HELIUM VALUE c.f. AIR (L.D.U.)		HELIUM VALUE c.f.(-20) (L.D.U.)		URANIUM IN WATER (ppb)	RADON VALUE (GAMMA) COUNTS/ 2MINUTES
					375ml	20ml	375ml	20ml		
1	55	7	48	7	-20	-15	0	5	2	1929
2	49	2.7	46.3	7.7	+5	-3	25	17	7	6970
3	70	6.3	63.7	6.6	-11	-14	9	6	2	11339
4	81	10.2	70.8	15.2	-16	-15	4	5	3	2883
5	100	12.35	97.65	17.35	-10	-11	10	9	2	-
6	81	15.1	65.9	20.1	-7	-15	13	5	11	3667
7	63	3.1	59.9	8.1	-11	-13	9	7	4	4423
8	62	8.3	53.7	13.3	-10	-1	10	19	4	2250
9	77	33.8	43.2	38.8	-4	-4	16	16	9	697
10	40	8.3	31.7	13.3	-3	-5	17	15	2	8814
11	64	5	59	10.0	-5	-17	15	3	3	5874
12	101	27.5	73.5	32.5	-5	-10	15	10	1	572
13	84	15.3	68.7	19.3	-7	-10	13	10	1	1394

Instruments used: Scintrex UA 3 Uranium Analyser

Du Pont 120 SSA Helium leak Detector

southern boundary of the E.L. This indicates a radon source paralleling the southern boundary.

8.3 Helium Results

Duplicate water samples were taken from each drill hole and analysed for Helium. The results are presented in Table 2.

The Helium Mass Spectrograph gives a print out with a resolution of one Leak Detection Unit. (L.D.U.). this is equivalent to approximately 20 ppb. i.e. the accuracy of measurement is ±10 ppb.

The results range in value from the lowest value designated as a zero calibration point to +25 L.D.U.

The samples analysed were from 325ml and 20ml bottles for each hole. At the time of sampling, the operator felt that the smaller bottle size suffered from a loss in sensitivity due to a higher percentage of sample dilution. The results inicate this to be the case. As seen in Figure 8, (comparison plot of Bore Sampling Results) a comparison of the values shows the larger bottle size to have given generally higher values.

Figures 4 and 5 show the Helium values contoured at 5 L.D.U. intervals. There is a halo of increasing values from south to north. Both sample sizes give a similar picture and show the low values extending further north in the west of the E.L. In both cases the high values are near the west and east boundaries of the E.L.

8.4 Uranium Analysis

Following the helium analysis, the water samples were analysed for uranium by R.V. Shulz, the Senior Chemist at the Occupational Hygiene Laboratory in Darwin. The analysis utilised a Scintrex UA3 uranium analyser by the method of standard addition.

The values obtained range from less than 1 ppb to 11 ppb. The contour map of the uranium values (Figure 7) shows the increasing concentration from north to south in the southern portion of the E.L., with the higher values in the southwest.

This indicates a source for the uranium close to the south-western corner of the E.L., which is in agreement with the trend of the radon survey.

The most likely source for the anomalous halo is the Mt.Litchfield Granite outcropping to the south of the E.L.

At present, the N.T.G.S. has a Chemist studying the uranium regime in the Litchfield Province granites. The results of this will be available in the near future.

9. COMPARISON OF RESULTS AND DISCUSSION

The radon and uranium haloes obtained show a trend expected from a source such as a uraniferous granite; dilution of uranium in the ground water away from the source and the decay of radon with time as it emanates from radioactive decay, both occuring in a near exponential fashion.

Higher values at greater distances than expected could be due to preferred zones of seepage e.g. faults and joints or local sources within the sedimentary pile.

Helium having no half life and a very small atomic size can permeate and be detected over far greater distances than radon.

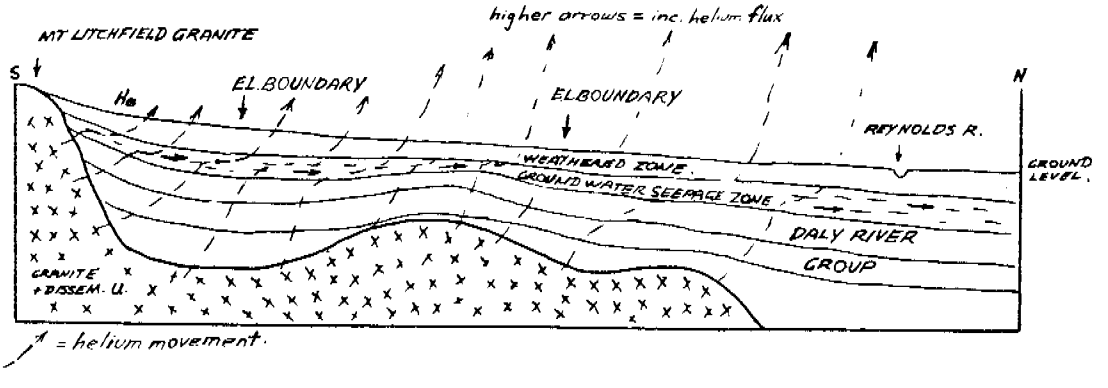
The helium results show a reverse trend to the uranium and radon contours, however, the values increase at a near steady rather than exponential rate towards the north.

An important factor is that the sampling was carried out after a period of heavy rainfall in the area. It is probable that at the time there was significant movement of water from high water table to low water table areas, and in the general direction of the Reynolds River. It was noted that several of the deeper holes have made considerable water heads since being drilled, which implies the existence of a confined preferred seepage/aquifer pathway within the sediments. When drilled, the confined water is able to equalize to the free (zero piezometric) level.

One explanation for the helium distribution is that helium has been derived from a source in the south then travelled in a northerly down drainage direction along preferred aquifers. During this migration, more helium would be derived from high uranium horizons in the Daly River Group. Anomalous uranium values have been recorded in the limestone horizons of the Daly River Group and the limestone being more readily dissolved by ground waters, would become the predominant seepage zones. These factors could enhance the effect of helium increasing in content from its primary source.

Due to the high mobility of helium, any deep seated sources can also be adding to the helium content of the ground waters as they pass over the zones of flux from these sources. This is represented in the diagram below.

CROSS SECTIONAL SKETCH FROM SOUTH TO NORTH ACROSS AREA EL 2487.



Contrary to the solution proposed above, the helium distribution observed could be due to other factors not observed in the proximity of the E.L., since helium anomalies are often found to be offset from their origin by large distances.

An important consideration regarding the occurrence of uranium in the ground water is that its presence is highly dependent on the Eh and Ph conditions of the ground waters and the chemistry of the lithologies present. Dilution is only one of the distribution factors.

The uranium in a granite source may be easily dissolved by groundwaters only to be scavenged by phosphates and carbonates in the neighbouring sediments, thus giving a sharp decline in the water uranium content as the distance from the main source increases even through the sediments themselves may be weakly enriched.

10. CONCLUSION

The granitoids of the Litchfield Province typically have late stage mineral assemblages indicating that they are expressions of a larger deeper seated granite complex.

The Rubidium/strontium age dating and metamorphic evidence gives the outcropping granites an Upper Proterozoic to Carpentarian age rather than Archean as previously recognised. Therefore, E.L. 2487 is less propsective as being analagous to the Rum Jungle Uranium Field.

Studies and field exploration carried out by ANZECO and AAR indicate that the uranium radon and helium distributions in the groundwaters of E.L. 2487 are probably due to the Mt. Litchfield Granite seen outcropping to the south.

Information to date indicates that there is little potential for economic uranium deposits in the basement rocks of E.L. 2487.

GRANT W. CARDNO
GEOLOGIST

11. REFERENCES

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BMR Map 1979	Solid Geology of the Pine Creek Geosyncline Northern Territory 1:500,000.
BMR Map 1979	Total Magnetic Intensity contours of the Pine Creek Geosyncline Northern Territory 1:500,000.
Division of National Mapping 1975	National Topographic Map Series Reynolds River, Sheet 5071 1:100,000.
N.T.G.S. Map 1981	Magnetic Intensity Contours Reynolds River Northern Territory (being published)
N.T.G.S. Map 1981	Radiometric contours Reynonds River Northern Territory (being published).

APPENDIX 1

EXPENDITURE STATEMENT

LITCHFIELD PROJECT E.L. 2487

Total exploration costs for the duration of exploration since the granting of E.L. 2487 on the 11th September, 1980 to 1st August, 1982.

PERIOD		OPERATOR
1st Oct-31st Dec, 1980	4,277.66	ANZECO
1st Jan-31st Mar, 1981	5,612.75	ANZECO
1st April-30th June, 1981	6,059.47	ANZECO
1st July-30th Sept, 1981	15,506.60	ANZECO
1st Oct-31st Dec, 1981	6,444.16	ANZECO
1st Jan-31st March, 1982	1,597.00	AAR
1st April-1st August,1982	4,567.00	AAR
TOTAL:	$ 44,064.64	

The page following gives a detailed expenditure for the peiod 1.4.82 to 1.8.82.

BRISBANE.
28th July, 1982.

MINES ADMINISTRATION PTY LIMITED

STATEMENT OF EXPENDITURE

EL 2487 LITCHFIELD

FROM 1.4.82 TO 1.8.82.

REF: AC/MDE

	$	$
Geophysical & Geological Costs		
Salaries and Wages	2,896	
Drafting Supplies, etc.	4	2,900
Logistics		
Travelling and Accommodation	1,620	
Vehicle Hire	47	1,667
		$4,567

.....

G.T. Hall,
ACCOUNTANT.

APPENDIX 2

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

Percussion DRILLING LOG

DRILL HOLE No. 1

LOCATION N.T.
PROJECT LITCHFIELD EL 2487
COORDINATES 5071-861177
INCLINATION Vertical BEARING

COLLAR ELEVATION ≏ 57m
TOTAL DEPTH 12m
DRILLED BY Stanley Drilling Co.
CASING 1m P.V.C. Collar

LOGGED BY GWC
STARTED 23/9/81
COMPLETED 23/9/81
SHEET No. 1 OF 1

METRES FROM	METRES TO	DESCRIPTION	GRAPH LOG	CORE REC. %	ANALYSES METRES FROM	METRES TO	METRES Interval	He (water)	Radon canister		U ppb	
0 -	4m	Soil cover and weathered, etched Grey White limestone						<20LDU (375ml)	counts /2min			
4 -	10m	Red-Brown Fe stained, lightly weathered. Weakly foliated/fissile micaceous siltstone.						<15LDU (20ml)	1929		2	
10 -	12m	Weathered Grey White Limestone as above										
		Water sample obtained at 12m										
		Water encountered at 7m										

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

Percussion DRILLING LOG

DRILL HOLE No. 2

LOCATION N.T.
PROJECT LITCHFIELD EL 2487
COORDINATES 5071-878185
INCLINATION Vertical BEARING

COLLAR ELEVATION ≐ 50m
TOTAL DEPTH 13m
DRILLED BY Stanley Drilling Co.
CASING 1m P.V.C. Collar

LOGGED BY GWC
STARTED 23/9/81
COMPLETED 23/9/81
SHEET No. 1 OF 1

METRES FROM	METRES TO	DESCRIPTION	GRAPH LOG	CORE REC. %	ANALYSES METRES FROM	METRES TO	METRES Interval	He (water) LDU ±5 (375cc) -3 (20cc)	Radon c/2min	U ppb		
0 -	6m	Surface scattering of Fe Pisolites										
		White Grey Weathered Limestone							6970	7		
6 -	8m	Weathered, Red/pink fissile siltstone										
8 -	10m	"fresh" Blue grey fissile finely micaceous foliated siltstone.										
10 -	13m	Weathered Zone of Red fissile siltsone.										
		Standing water level 2.7m										
		Water sample from 7.7m										
		(Helium) 375ml, + 5LDU, 20ml, -3LDU.										
		(Radon canister) 6970 c.p. 2min.										

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

Percussion DRILLING LOG

DRILL HOLE No. 3

LOCATION N.T.
PROJECT LITCHFIELD EL 2487
COORDINATES 5071-833174
INCLINATION Vertical BEARING

COLLAR ELEVATION ≃ 65m
TOTAL DEPTH 14m
DRILLED BY Stanley Drilling Co.
CASING 1m P.V.C. Collar

LOGGED BY GWC
STARTED 23/9/81
COMPLETED 23/9/81
SHEET No. 1 OF 1

METRES FROM	METRES TO	DESCRIPTION	GRAPH LOG	CORE REC. %	ANALYSES Water for He/U METRES FROM	METRES TO	METRES Interval	He LDU water	Radon c/2min	U ppb
0 -	2m	Soil Cover, Fe Pisolites (Yellow Brown)						-11 (375cc)		2
2 -	6m	Chocolate brown siltstone, fissile.						-14 (20cc)	11339	
6 -	8m	Chocolate brown and fresher grey fissile siltstone								
8 -	10m	"fresh" grey Graphite finely micaceous fissile siltstone /shale								
10 -	14m	Weathered Red Brown siltstone as above.								
		Standing water level = 6.3m								
		Sample at 6.6m (water)								
		Helium 375ml, -11LDU 20ml, -14LDU								
		Radon canister counts/2min (γ) 11339.								

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

blade/percussion DRILLING LOG

DRILL HOLE No. 4

LOCATION N.T.
PROJECT LITCHFIELD
COORDINATES 5071-818183
INCLINATION Vertical BEARING

COLLAR ELEVATION ≏ 82m
TOTAL DEPTH 28m
DRILLED BY Stanley Drilling Co.
CASING 1m PVC Collar

LOGGED BY GWC
STARTED 23/9/81
COMPLETED 23/9/81
SHEET No. 1 OF 1

METRES FROM	METRES TO	DESCRIPTION	GRAPH LOG	CORE REC. %	ANALYSES METRES FROM	METRES TO	METRES Interval	He LDU (water)	Radon c/2min	U ppb
0 -	4m	Red brown weathered siltstone + Fe pisolites						-16 (375cc)		
								-15 (20cc)	2883	3
4 -	14m	Red brown micaceous (fine) fissile siltstone								
14 -	19m	"Fresh" blue grey micaceous fissile siltstone								
19 -	28m	Blue grey & chocolate brown siltstone as above								
		Standing water level = 10.2m								
		water sampled at 15.2m								
		(Helium) -16 LDU (375ml) -15 LDU (20ml)								
		Radon Value, c.per 2 min. ∑ = 2883.								

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

blade DRILLING LOG

DRILL HOLE No. 5

LOCATION N.T.
PROJECT LITCHFIELD EL 2487
COORDINATES 5071-804194
INCLINATION Vertical BEARING

COLLAR ELEVATION ≏ 100m
TOTAL DEPTH 20m
DRILLED BY Stanley Drilling Co.
CASING 1m P.V.C. Collar

LOGGED BY GWC
STARTED 23/9/81
COMPLETED 23/9/81
SHEET No. 1 OF 1

METRES FROM	METRES TO	DESCRIPTION	GRAPH LOG	CORE REC. %	ANALYSES METRES FROM	METRES TO	METRES Interval	He (water) LDU	Radon c/2min	U ppb		
		Blade drilling 0-20m										
0 -	5m	Yellow "A" horizon with Red & Grey-white (Kaolin)						-10 (375cc)				
		Clayey soil horizons						-11 (20cc)	NA	2		
5 -	8m	Red brown weathered siltstone										
8 -	20m	Red brown and grey fine fissile micaceous siltstone										
		Standing water level 12.35m										
		Water sample depth 17.35m										
		(Helium) 375ml =-10 LDU 20ml = -11 LDU										
		(Radon) No Value										

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

blade/percussion DRILLING LOG

DRILL HOLE No. 6

LOCATION N.T. AUSTRALIA
PROJECT LITCHFIELD EL 2487
COORDINATES 5071-784188
INCLINATION Vertical BEARING

COLLAR ELEVATION ≏ 80m
TOTAL DEPTH 52m
DRILLED BY Stanley Drilling Co.
CASING 1m P.V.C. Collar

LOGGED BY GWC
STARTED 23/9/81
COMPLETED 24/9/81
SHEET No. 1 OF 1

METRES FROM	METRES TO	DESCRIPTION	GRAPH LOG	CORE REC. %	ANALYSES METRES FROM	METRES TO	METRES Interval	He (water) LDU	Radon c/2min	U water ppb
0 -	6m	Red brown weathered siltstone, Fe pisolites and clayey soils.						-7 (375cc) -15 (20cc)	3667	11
6 -	52m	Red and Grey fissile siltstone/shale variable colour with variable weathering.								
		Standing water level = 15.1m								
		Water sampled at 20.1m								
		(Helium); 375ml = -7LDU, 20ml = -15 LDU								
		Radon canister; counts/2min, 3667								

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

Blade/percussion DRILLING LOG

DRILL HOLE No. 7

LOCATION N.T.
PROJECT LITCHFIELD EL 2487
COORDINATES 5071-764190
INCLINATION Vertical BEARING

COLLAR ELEVATION ≏ 70m
TOTAL DEPTH 18m
DRILLED BY Stanley Drilling Co
CASING 1m R.V.C. Collar

LOGGED BY GWC
STARTED 24/9/81
COMPLETED 24/9/81
SHEET No. 1 OF 1

METRES FROM	METRES TO	DESCRIPTION	GRAPH LOG	CORE REC. %	ANALYSES METRES FROM	METRES TO	METRES Interval	He (water) LDU	Radon c/2min	U (water) ppb
0 -	2m	Red/orange soil cover						$\bar{1}1$ (375cc)		
2 -	8m	Dark Red Brown weathered fissile shale/siltstone						$\bar{1}3$ (20cc)	4423	4
8 -	18m	"fresh" blue grey fissile shale/siltstone as above								
		TD = 18m								
		Standing water level = 3.10m								
		Water sampled at 8.10m								
		Helium Values 375ml, $\bar{1}1$ L.D.U. 20ml, $\bar{1}3$ L.D.U.								
		Radon value canister ϒ counts/2min, 4423 .								

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

blade/percussion DRILLING LOG

DRILL HOLE No. 8

LOCATION N.T.
PROJECT LITCHFIELD EL 2487
COORDINATES 5071-747192
INCLINATION Vertical BEARING

COLLAR ELEVATION ≏ 70m
TOTAL DEPTH 42m
DRILLED BY Stanley Drilling Co
CASING 1m PVC Collar

LOGGED BY GWC
STARTED 24/9/81
COMPLETED 24/9/81
SHEET No. 1 OF 1

METRES FROM	METRES TO	DESCRIPTION	GRAPH LOG	CORE REC. %	ANALYSES METRES FROM	METRES TO	METRES Interval	He (water) LDU	Radon c/2min	U (water) ppb
0 -	2m	Red/orange soils and weathered shale						-10 (375cc)		
2 -	10m	Yellow Brown, weathered shale						-1 (20cc)	2250	4
10 -	42m	Blue/grey fissile siltstone/shale								
		Standing water level = 8.3m								
		Water sampled at 13.3m								
		Helium Value (LDU) 375ml = -10 20ml = -1								
		Radon canister value (ɣ) cp.2min = 2250								

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

blade/percussion DRILLING LOG

DRILL HOLE No. 9

LOCATION N.T.
PROJECT LITCHFIELD
COORDINATES 5071-727182
INCLINATION Vertical BEARING

COLLAR ELEVATION ≏ 80m
TOTAL DEPTH 42m
DRILLED BY Stanley Drilling Co
CASING 1m PVC Collar

LOGGED BY GWC
STARTED 24/9/81
COMPLETED 24/9/81
SHEET No. 1 OF 1

METRES FROM	METRES TO	DESCRIPTION	GRAPH LOG	CORE REC. %	ANALYSES METRES FROM	METRES TO	METRES Interval	He (water) LDU	Radon c/2min	U (water) ppb
0 -	2m	Orange Fe rich soil						-4 (375cc)		
2 -	10m	Partially weathered yellow-brown-grey fissile shale						-4 (20cc)	697	9
10 -	32m	Blue Grey fissile, micaceous siltstone/shale								
		Hammer drilled from 16m								
32 -	42m	Brown weathered highly indurated shale - heavily powdered under hammer drilling								
		Standing water level = 33.8m								
		Water sampled at 38.8m								
		Helium (LDU) 375ml, -4 LDU 20ml, -4								
		Radon canister value & counts/2min 697								

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

blade/percussion DRILLING LOG

DRILL HOLE No. 10

LOCATION N.T.
PROJECT LITCHFIELD EL 2487
COORDINATES 5071-716171
INCLINATION Vertical BEARING

COLLAR ELEVATION ≃ 40m
TOTAL DEPTH 24m
DRILLED BY STANLEY DRILLING CO
CASING 1m PVC Collar 3m PVC Bottom

LOGGED BY GWC
STARTED 24/9/81
COMPLETED 24/9/81
SHEET No. 1 OF 1

METRES FROM	METRES TO	DESCRIPTION	GRAPH LOG	CORE REC. %	ANALYSES METRES FROM	METRES TO	METRES Interval	He (water) LDU	Radon c/2min	U (water) ppb
0 -	2m	Orange/brown Fe rich soil & pisolites						-3 (375cc)		
2 -	4m	Grey Yellow/Brown soil						-5 (20cc)	8814	2
4 -	8m	Yellow-brown soil								
8 -	11m	Yellow to Choc. Brn-red shale with siliceous horizon								
11 -	24m	Blue grey variably weathered siltstone/shale								
		Struck strong water flow at 14m.								
		Standing water level = 8.3m								
		Water sample at 13.3m								
		Helium value (LDU) 375ml, -3 20ml, -5								
		Radon canister ɣ value counts/2min 8814								

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

blade/percussion DRILLING LOG

DRILL HOLE No. 11

LOCATION N.T.
PROJECT LITCHFIELD
COORDINATES 5071-738192
INCLINATION Vertical BEARING

COLLAR ELEVATION ≃ 65m
TOTAL DEPTH 15m
DRILLED BY Stanley Drilling Co.
CASING 1m PVC Collar

LOGGED BY GWC
STARTED 24/9/81
COMPLETED 24/9/81
SHEET No. 1 OF 1

METRES FROM	METRES TO	DESCRIPTION	GRAPH LOG	CORE REC. %	ANALYSES METRES FROM	METRES TO	METRES Interval	He (water) LDU	Radon c/2min	U (water) ppb
0 -	4m	Yellow Brown soil cover						⁻5 (375cc)		
								⁻17 (20cc)	5874	3
4 -	15m	Blue grey fissile, siltstone/shale, and fine								
		mica foliation.								
		Standing water level = 5m								
		Water sampled at 10m								
		Helium (LDU) 375ml, ⁻5. 20ml, ⁻17								
		Radon canister ✗ counts/2min 5874								

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

blade/percussion DRILLING LOG

DRILL HOLE No. 12

LOCATION N.T.
PROJECT LITCHFIELD
COORDINATES 5071-787212
INCLINATION Vertical BEARING

COLLAR ELEVATION ≃ 105m
TOTAL DEPTH 42m
DRILLED BY Stanley Drilling Co.
CASING 1m PVC Collar

LOGGED BY GWC
STARTED 25/9/81
COMPLETED 25/9/81
SHEET No. 1 OF 1

METRES FROM	METRES TO	DESCRIPTION	GRAPH LOG	CORE REC. %	ANALYSES METRES FROM	METRES TO	METRES Interval	He (water) LDU	Radon c/2min	U (water) ppb
0 -	2m	Red brown soil cover and weathered shale						-5 (375cc)		
2 -	42m	Pink-blue grey and red, fissile, micaceous, moderately indurated siltstone/shale.						-10 (20cc)	572	< 1
		Standing water level 27.5m								
		Water sampled at 32.5m								
		Helium, LDU Values 375ml -5, 20ml -10								
		Radon canister ✕ value, counts/2min = 572								

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

blade/percussion DRILLING LOG

DRILL HOLE No. 13

LOCATION N.T.
PROJECT LITCHFIELD
COORDINATES 5071-773228
INCLINATION Vertical BEARING

COLLAR ELEVATION ≏ 90m
TOTAL DEPTH 22m
DRILLED BY Stanley Drilling Co
CASING 1m PVC Collar

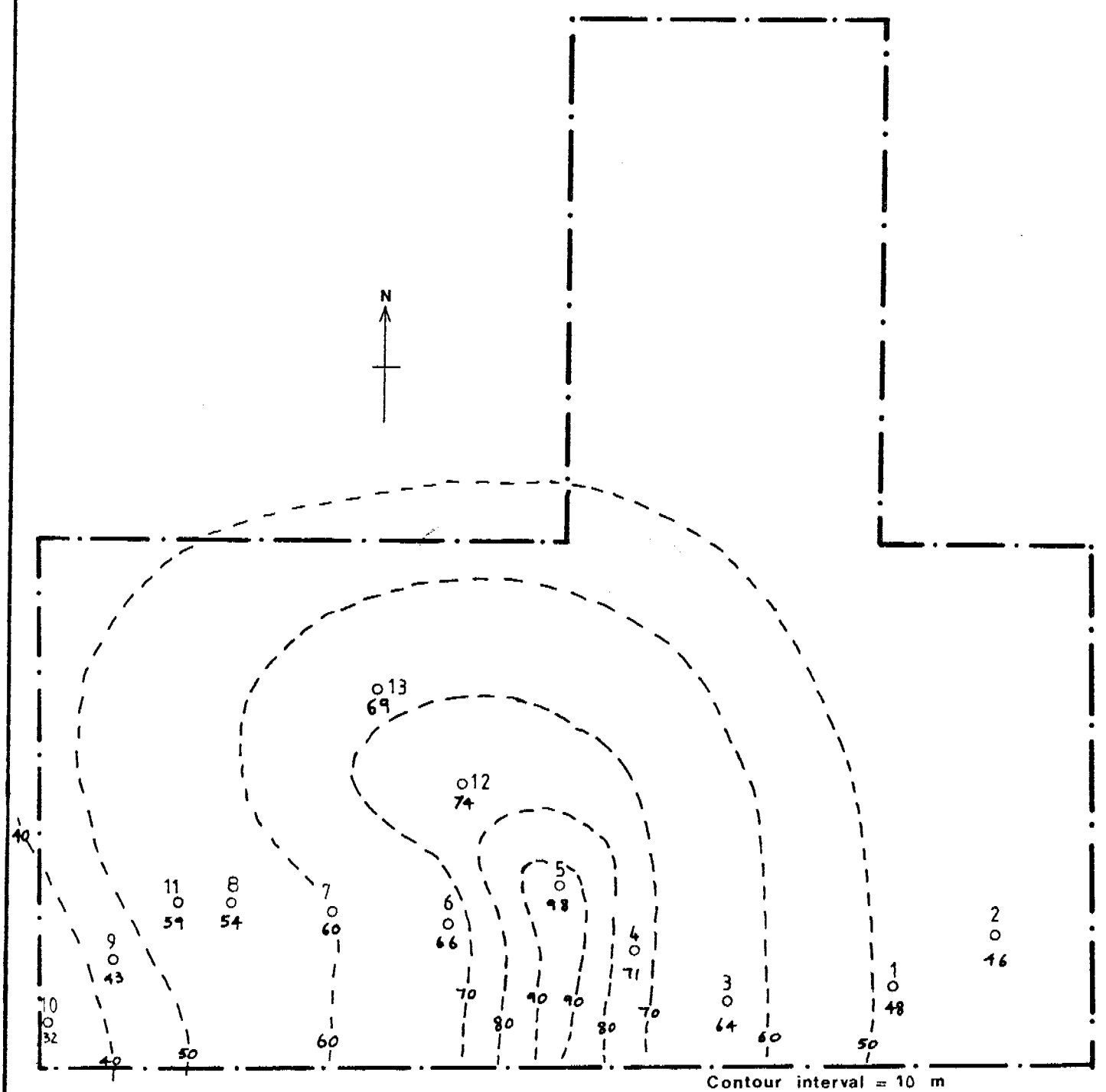
LOGGED BY GWC
STARTED 25/11/81
COMPLETED 25/11/81
SHEET No. 1 OF 1

METRES FROM	METRES TO	DESCRIPTION	GRAPH LOG	CORE REC. %	ANALYSES METRES FROM	METRES TO	METRES Interval	He (water) LDU	Radon c/2min	U (water) ppb
0 -	2m	Yellow brown and red soil cover						~7 (375cc)		
2 -	4m	Red and white kaolinized weathered siltstone						~10 (20cc)	1394	1
4 -	22m	Pink and Red Grey fine, fissile, micaceous, siltstone/shale								
		Standing water level = 15.3m								
		Water sampled at 19.3m								
		Helium Valued (LDU) 375ml, ~7. 20ml, ~10.								
		Radon canister ☓ value, counts/2mins = 1394								

FIGURES 3 to 8

FIGURE 3

E.L. 2487 Litchfield STANDING WATER LEVEL CONTOUR MAP



Scale 1:100 000

0 5 Km

2 Drill hole number 2 location

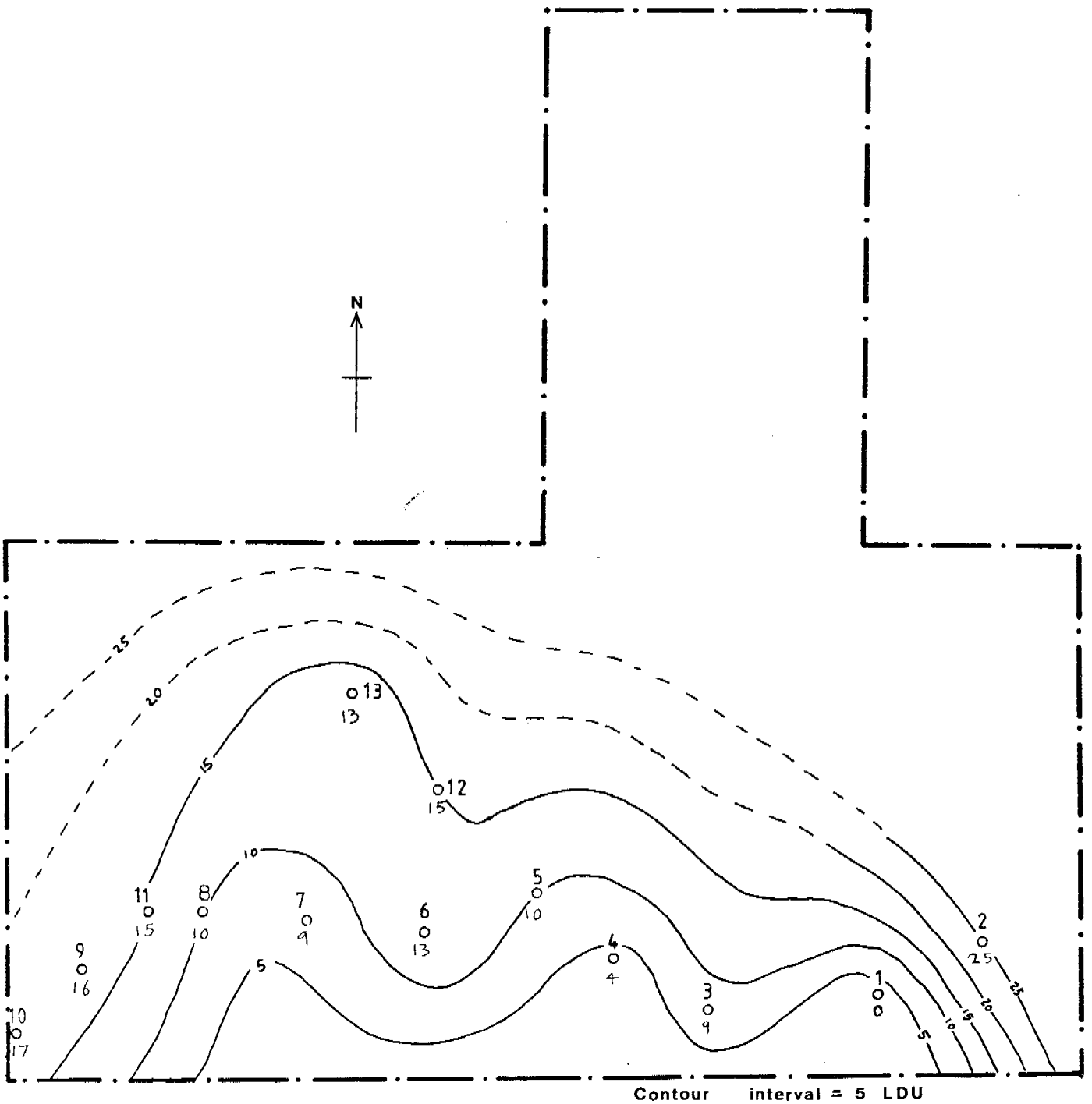
42 42 metre standing ground water level (A.S.L.)

Contour level

AUTHOR : C.M. SENNITT

DATE : JULY, 1982

E.L. 2487 Litchfield HELIUM IN WATER (375 ml sample) CONTOUR MAP



Scale 1.100 000

0 5 Km

2 / 0 Drill hole number 2 location

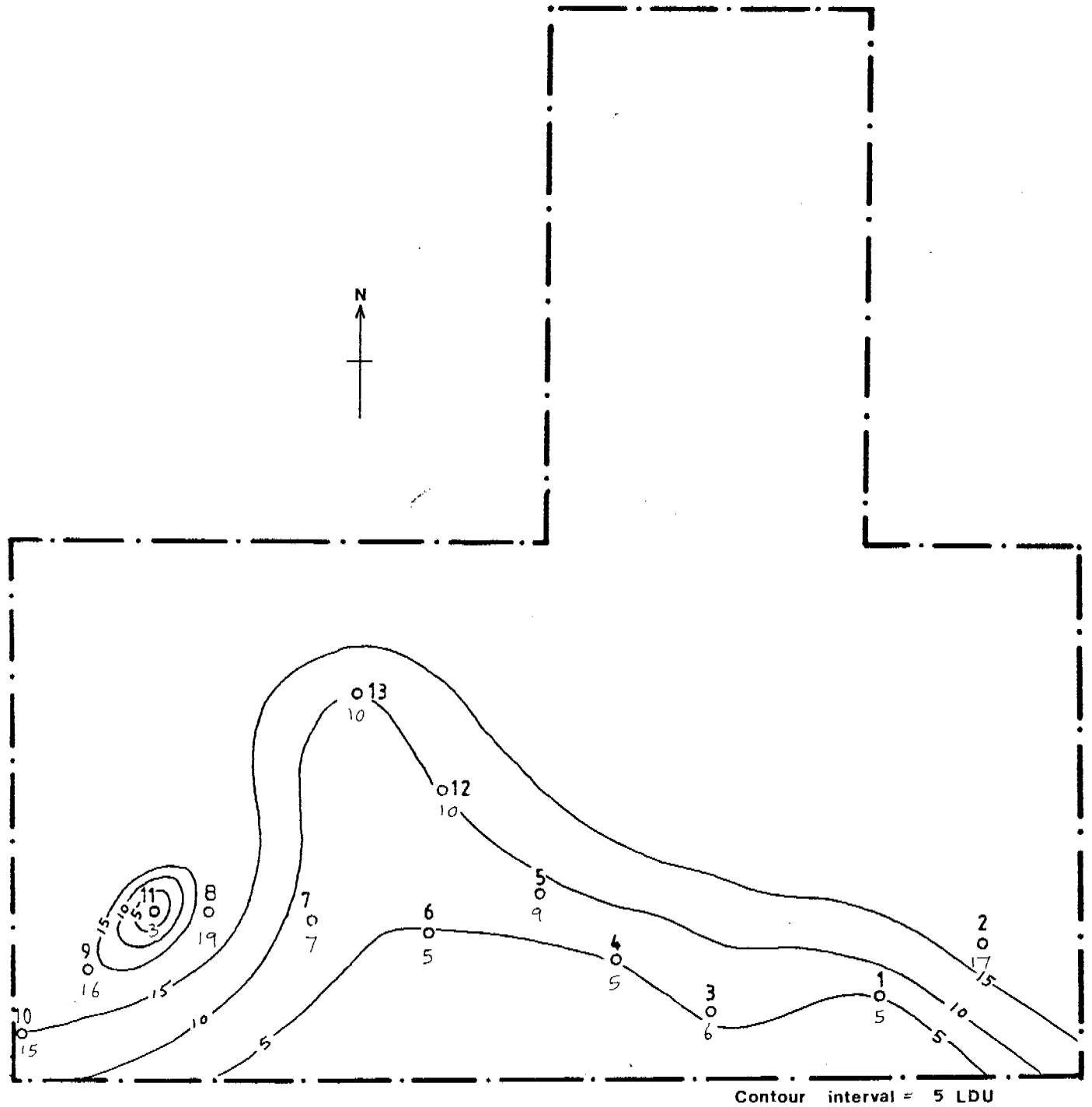
0 / 17 17 L.D.U. (1 L.D.U. ≃ 20 ppb He)

Contour level in L.D.U.

AUTHOR : C.M. SENNITT

DATE : JULY, 1982

E.L. 2487 Litchfield HELIUM IN WATER
(20ml sample) CONTOUR MAP



Contour interval = 5 LDU

Scale 1.100 000

0 5 Km

2 o Drill hole number 2 location

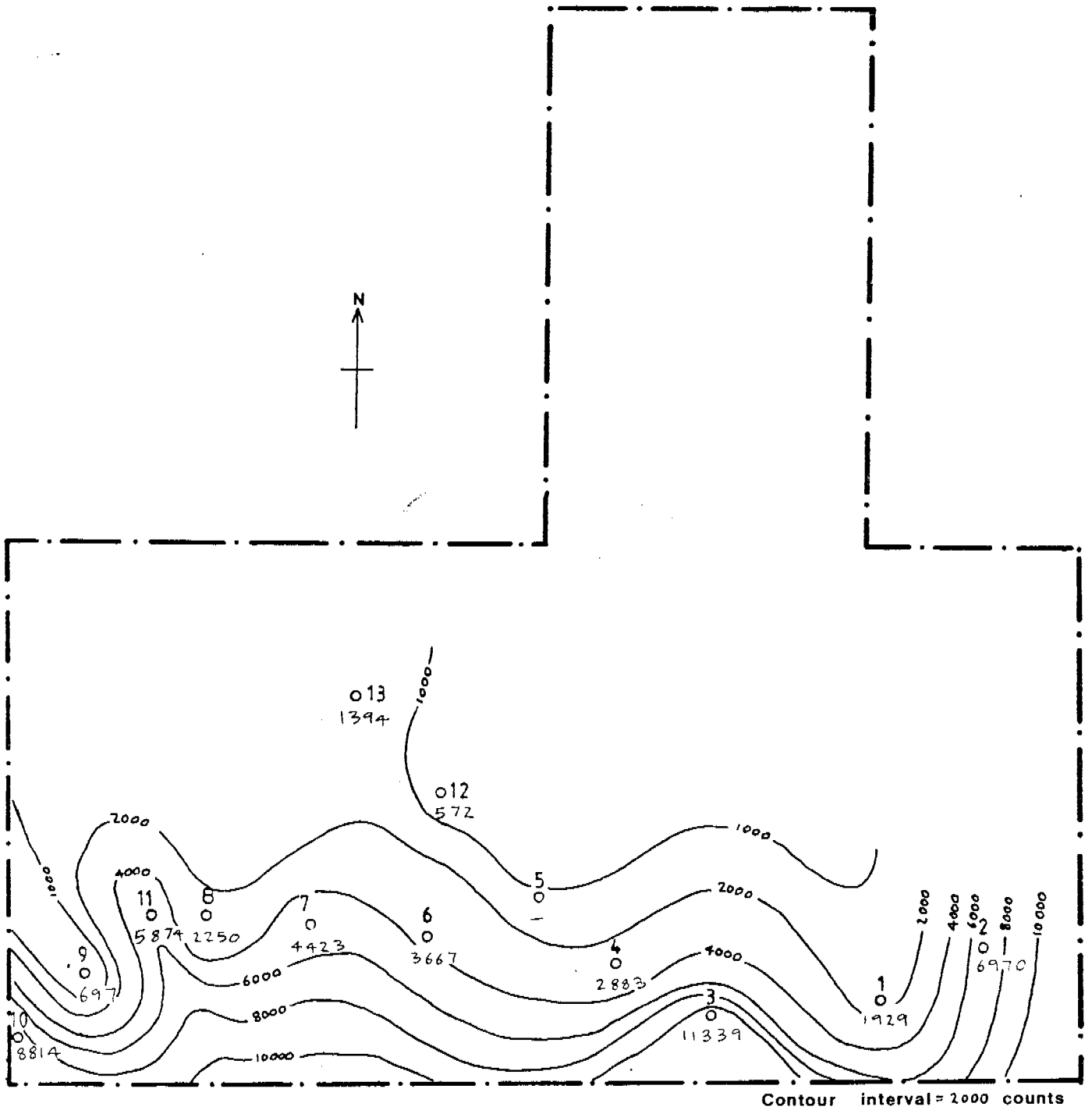
o 17 17 L.D.U. (1 L.D.U. ≃ 20 ppb He)

—— Contour level in L.D.U.

AUTHOR : C.M. SENNITT

DATE : JULY, 1982

E.L. 2487 Litchfield BOREHOLE RADON (Radon derived γ counts) CONTOUR MAP



Scale 1.100 000

0 5 Km

2 Drill hole number 2 location

3447 3447 counts / 2 min (Radon – γ counts)

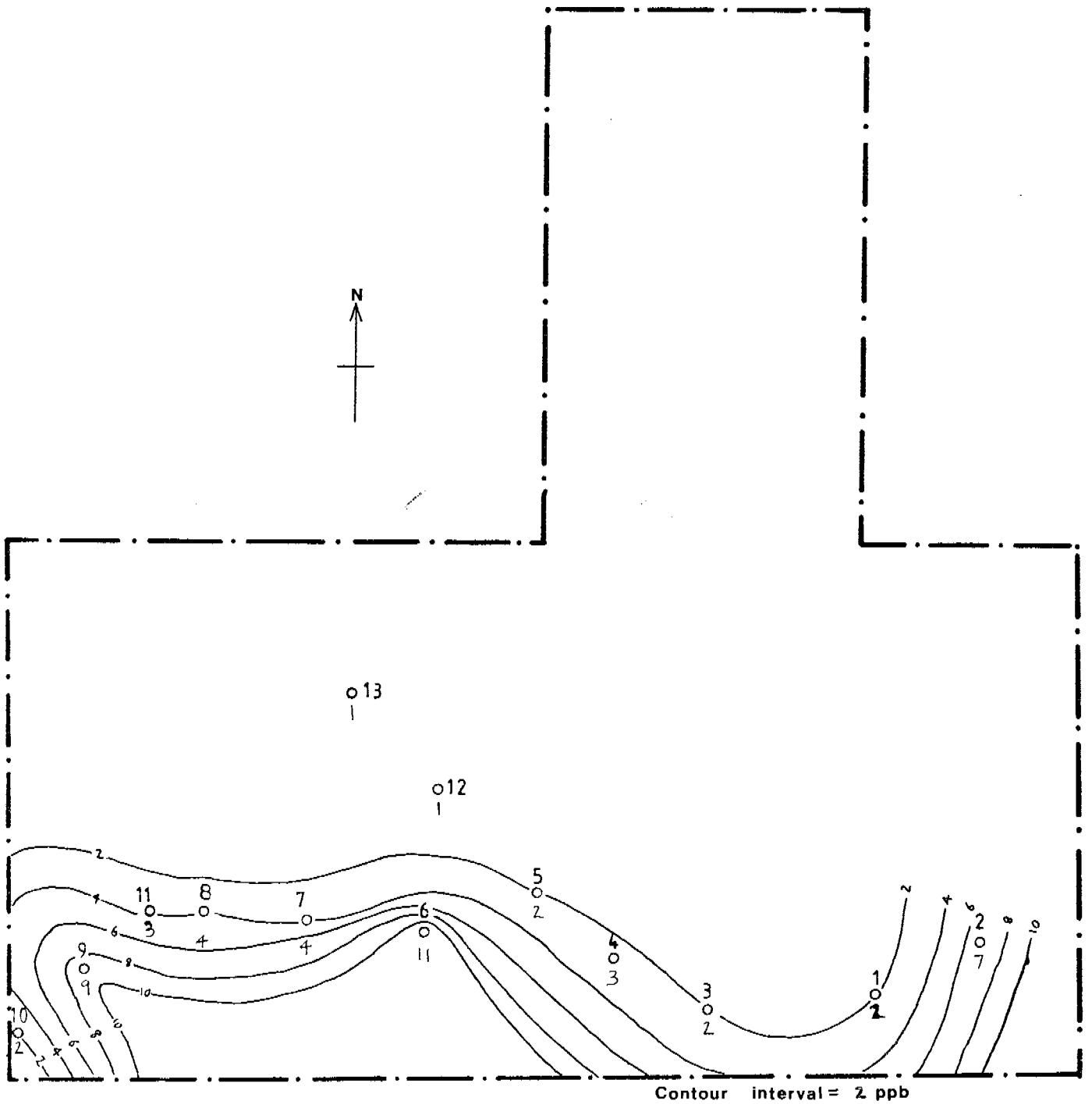
Contour level

AUTHOR : C.M. SENNITT

DATE : JULY, 1982

FIGURE 7

E.L. 2487 Litchfield URANIUM IN WATER CONTOUR MAP



Scale 1:100 000

0 5 Km

2 Drill hole number 2 location

3 Uranium ppb in H_2O sample

Contour level

AUTHOR : C.M. SENNITT

DATE : JULY, 1982

E.L. 2487 Litchfield

COMPARISON PLOT OF BORE SAMPLING RESULTS

AUTHOR : C.M. SENNITT

DATE : JULY, 1982

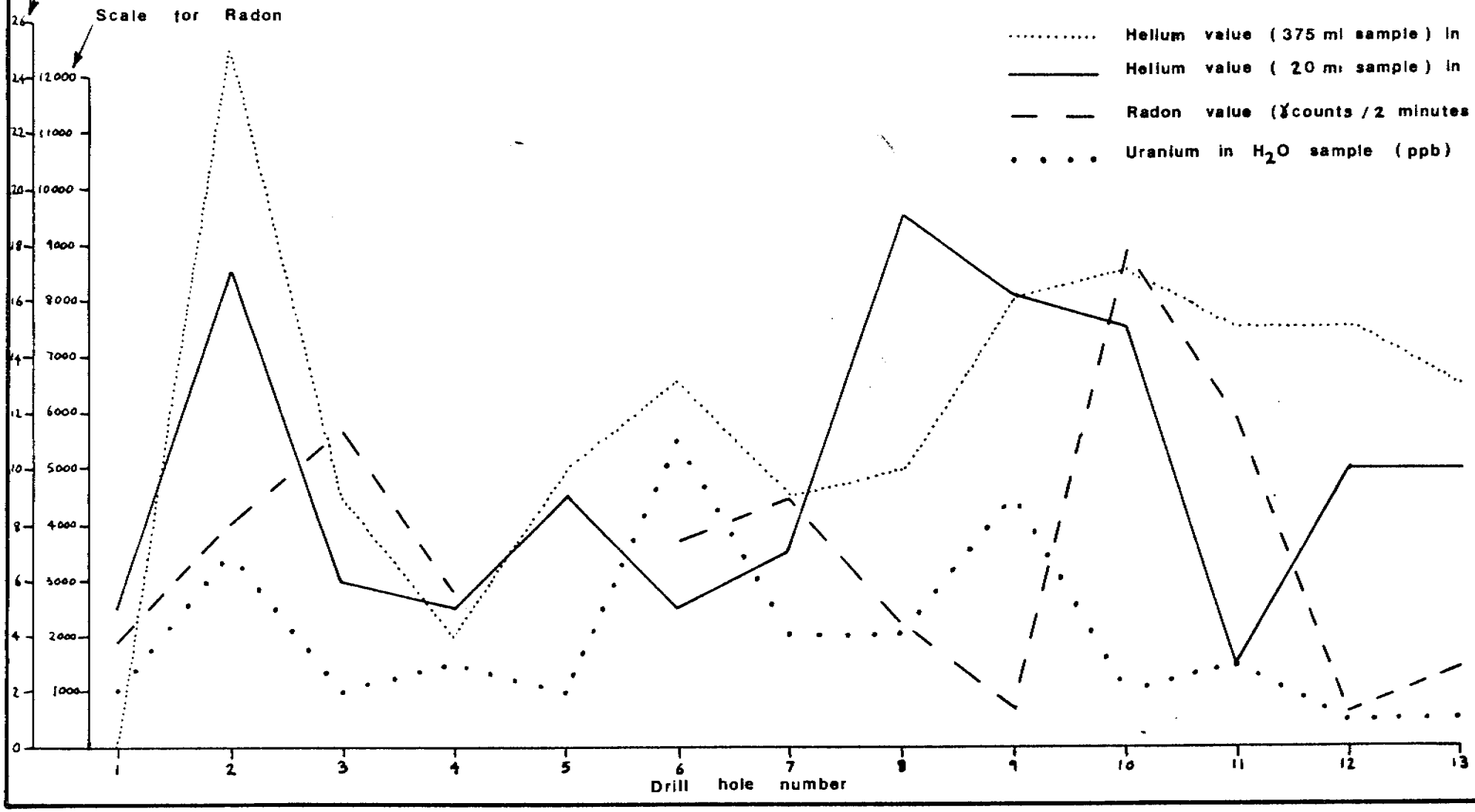
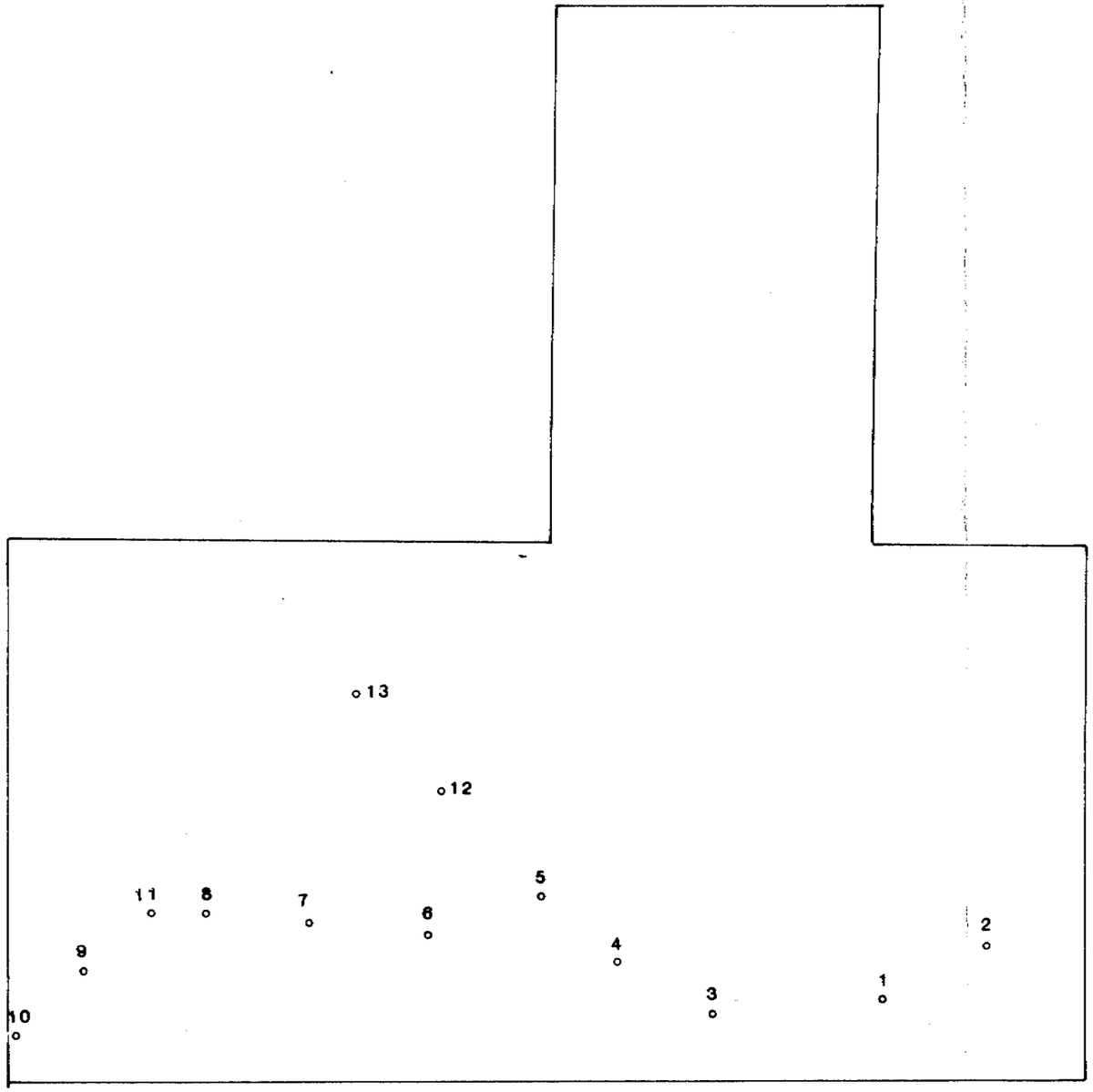


FIGURE 8



Km
0 5

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

E.L.2487 LITCHFIELD

DRILL-HOLE LOCATIONS

Prepared		Drawn ERD
Scale 1:100000	Date	Proj
	Report	Dwg.

CR82/264